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Evaluation of wet corn gluten feed as an ingredient in diets for lactating dairy cows

Abstract

Thirty-two Holstein cows were used in two 2x2 Latin squares with 28-day periods to evaluate the effect of including wet corn gluten feed in diets for lactating dairy cows. Wet corn gluten feed (WCGF) was fed to cows housed in freestalls at 20% of the diet dry matter. Cows fed WCGF consumed more dry matter, and produced more milk and more energy-corrected milk than cows fed the control diet. Production efficiency was not different between diets. The percentages of fat and protein in milk were not different between diets, but yields of all milk components were improved by including WCGF in the diet. Body weight and condition score were not affected by treatment. Plasma glucose, total amino acids, and urea nitrogen were similar between cows fed the control and WCGF diets. WCGF is an excellent feed for lactating dairy cows when included in the diet at 20% of the dry matter. Further studies are warranted to determine the upper limits of its dietary inclusion.; Dairy Day, 1999, Kansas State University, Manhattan, KS, 1999;

Keywords

Dairy Day, 1999; Kansas Agricultural Experiment Station contribution; no. 00-136-S; Report of progress (Kansas Agricultural Experiment Station and Cooperative Extension Service); 842; Dairy; Wet corn gluten feed; Lactating cows; Milk Yield

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EVALUATION OF WET CORN GLUTEN FEED AS AN INGREDIENT IN DIETS FOR LACTATING DAIRY COWS

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Summary

Thirty-two Holstein cows were used in two 2×2 Latin squares with 28-day periods to evaluate the effect of including wet corn gluten feed in diets for lactating dairy cows. Wet corn gluten feed (WCGF) was fed to cows housed in freestalls at 20% of the diet dry matter. Cows fed WCGF consumed more dry matter, and produced more milk and more energy-corrected milk than cows fed the control diet. Production efficiency was not different between diets. The percentages of fat and protein in milk were not different between diets, but yields of all milk components were improved by including WCGF in the diet. Body weight and condition score were not affected by treatment. Plasma glucose, total amino acids, and urea nitrogen were similar between cows fed the control and WCGF diets. WCGF is an excellent feed for lactating dairy cows when included in the diet at 20% of the dry matter. Further studies are warranted to determine the upper limits of its dietary inclusion.

(Key Words: Wet Corn Gluten Feed, Lactating Cows, Milk Yield.)

Introduction

Wet corn gluten feed (WCGF) is a potential feedstuff for dairy cows in the upper midwest. Studies conducted with feedlot steers indicated that it improved average daily gain and dry matter intake, reduced acidosis, and had feed efficiency values comparable to those of corn. Dairy producers who have used WCGF have reported increases in milk yield, but limited research findings are available. The objective of this study was to evaluate the effects of WCGF on dry matter

intake, milk yield, milk components, and feed efficiency when fed to lactating dairy cows.

Procedures

Thirty-two primiparous cows were used in two 2×2 Latin squares with 28-day periods. Cows were housed and fed in a freestall facility at the Kansas State University Dairy. Four pens each containing eight cows were utilized. Cows were pen fed diets formulated to meet or exceed NRC (1989) nutrient requirements. Diets were formulated to be isonitrogenous and isocaloric. Alfalfa hay and corn silage were the forage sources. Experimental treatments were: 1) control and 2) WCGF constituting 20% of the diet dry matter (Table 1).

Table 1. Experimental Diets

Ingredient	Diet	
	Control	WCGF ¹
	--% of Dry Matter--	
Alfalfa hay	30.0	23.3
Corn silage	15.0	8.3
Shelled corn	31.0	24.4
Soybean meal ²	5.0	-
Soybean meal ³	5.0	10.0
WCGF	-	20.0
Whole cottonseed	9.3	9.3
Wet molasses	1.0	1.0
Min-vit premix	3.7	3.7

¹Wet corn gluten feed.

²Solvent-extracted soybean meal.

³Mechanically extracted soybean meal subjected to heat (Soybest®).

Diets were fed free choice twice daily as a total mixed ration. Cows were fed each diet for 28 days, and pen feed intake and individual milk production were measured daily. Milk samples (a.m. and p.m. composite) were analyzed weekly for composition; protein, fat, lactose, solids-not-fat, milk urea nitrogen (MUN) and somatic cells were measured by the Heart of America DHI Laboratory, Manhattan, KS. Cows were weighed and scored for body condition at the beginning and end of each period. Blood samples were collected from the tail vein during the final week of each period, and total amino acids, glucose, and urea nitrogen concentrations in plasma were measured.

Results and Discussion

Cows fed WCGF consumed more ($P<.01$) dry matter and produced more ($P<.05$) milk and more ($P<.01$) energy-corrected milk than cows fed the control diet

(Table 2). Production efficiency was not different between diets, but yields of all milk components were improved ($P<.05$) by including WCGF in the diet.

Body weight and condition were not affected by treatment. Plasma glucose, total amino acids, and urea nitrogen were similar between cows fed the control and WCGF diets (Table 3). Interestingly, cows consuming the WCGF had lower milk urea nitrogen (MUN) values, even though blood plasma urea nitrogen (PUN) was not different. Plasma samples were collected approximately 5 hours after feeding and reflect only that point in time, whereas milk values represent an average of PUN values over the entire milking interval.

In summary, WCGF is an excellent feed for lactating dairy cows when included in the diet at 20% of the dry matter. Further studies are warranted to determine the upper limits of its dietary inclusion.

Table 2. Performance of Cows Fed Wet Corn Gluten Feed

Item	Diet		P-Value
	Control	WCGF ¹	
Daily intake (DM), lb	53.63	57.99	.02
Daily intake (DM), % of body wt	3.99	4.33	.02
Milk, lb/day	73.04	78.33	.04
Milk/feed	1.38	1.37	.78
Milk fat, %	3.48	3.46	.84
Milk protein, %	3.15	3.18	.33
Milk lactose, %	5.02	5.05	.02
Milk SNF ² , %	8.93	8.99	.10
MUN ³ , Mg/dL	16.07	15.64	.05
ECM ⁴ , lb/day	73.16	78.30	<.01
SCC, ×1000	111	189	.43

¹Wet corn gluten feed. ²Solids-not fat. ³Milk urea nitrogen. ⁴Energy-corrected milk.

Table 3. Effect of Wet Corn Gluten Feed on Plasma Metabolites

Item	Diet		P-Value
	Control	WCGF	
Glucose, mg/dL	71.32	72.90	.24
Total amino acids, mM	2.49	2.54	.24
Urea nitrogen, mg/dL	17.34	16.82	.55